

Remarks

Per the recent telephone conference between the Examiner and the undersigned on December 2, 2005, the Examiner is thanked for **agreeing to call** the undersigned to have a subsequent telephone conference prior to issuing the next office action. The undersigned's telephone number can be found at the bottom of this Amendment.

In the office action issued August 10, 2005, the Examiner (1) rejected claims 1, 11, 34, 35, and 39 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,766,374 issued to Glass, III et al. ("Glass"); (2) rejected claims 1, 2, 6-12, 15-19, 23-28; 31-35, 38-41, and 43-45 under 35 U.S.C. § 103(a) as being unpatentable over German patent DE 4227734A1 (the '734 reference) in view of U.S. Patent No. 4,880,348 issued to Baker et al. ("Baker"); and (3) rejected claims 3-5, 13, 14, 20-22, 29, 30, 36, 37, and 42 under § 103(a) as being unpatentable over the '734 reference in view of Baker, and further in view of U.S. Patent No. 5,886,521 issued to Hassan ("Hassan"). Reconsideration and allowance of the application are requested.

I. § 102(b) Claim Rejections

The Examiner initially rejected claims 1, 11, 34, 35, and 39 under 35 U.S.C. § 102(b) as being anticipated by Glass. Glass discloses a fuel channel flatness measurement system, which includes a tubular measurement unit 12 (shown in Fig. 2 of the reference) through which a fuel channel 24 can be passed to measure the flatness of the surfaces of the channel. The measurement unit 12 includes four sides: 22A, 22B, 22C, and 22D. An array of eddy current sensors 30 are positioned on adjacent sides 22A and 22B of the measurement unit 12. (Fig. 2 and col. 3, lines 18-24). There are no eddy current sensors on sides 22C and 22D of the measurement unit.

Independent claim 1 of the present application is directed to an apparatus for dynamically measuring the thickness of a test object. The apparatus includes "an eddy current sensor having first and second sensor heads, said sensor heads positioned opposite each other and defining a predetermined gap therebetween for passage by at least a portion of the test object through said gap." Glass does not disclose sensor heads positioned opposite each other. As noted above, Glass only discloses eddy current sensors on adjacent sides 22A and 22B of the measurement

unit. Glass' eddy current sensors are therefore arranged perpendicular to each other, not opposite each other.

Moreover, Glass teaches away from positioning eddy current sensors on opposite sides of the measurement unit because Glass only teaches the desirability of measuring the flatness of two adjacent sides of the fuel channel at a time. For example, Glass states that "measuring two adjacent faces of the fuel channel is normally adequate to provide data on the channel as deformation tends to be symmetrical on opposing faces. If it is desired to inspect all four faces, the channel may be rotated 180° and reinspected." (col. 2, lines 40-45).

Therefore, because Glass fails to disclose or suggest sensor heads positioned opposite each other, claim 1 is patentable over Glass.

Independent claim 11 is directed to a method of measuring thickness of a test object. The method includes the step of moving the test object through a gap between two eddy current sensor heads, said two eddy current sensor heads being positioned opposite each other. As noted above, Glass does not disclose or suggest two eddy current sensor heads being positioned opposite each other. Claim 11 is therefore patentable over Glass.

Independent claim 34 is directed to a method of measuring the thickness of a test object. The method includes the step of generating magnetic flux on opposite sides of the test object and sensing induced eddy currents on said test object. Glass does not disclose or suggest this step because, as noted above, Glass only discloses eddy current sensors positioned on adjacent sides of a measurement unit, not opposite sides. Thus, Glass' eddy current sensors generates magnetic flux on corresponding adjacent sides of the fuel channel, and not on opposite sides of a test object. Independent claim 34 is therefore patentable over Glass. Claim 35 depends on claim 34 and is also patentable over Glass.

Independent claim 39 is directed to an apparatus for measuring thickness of a test object. The apparatus includes means for generating magnetic flux on opposite sides of the test object and for sensing induced eddy currents on said test object. Glass does not disclose or suggest such means for generating magnetic flux because, as noted above, Glass only discloses eddy current sensors positioned on adjacent sides of a measurement unit, not opposite sides. Glass,

therefore, does not have means for generating magnetic flux on opposite sides of a test object. Independent claim 34 is therefore patentable over Glass. Claim 35 depends on claim 34 and is also patentable over Glass.

II. § 103 Claim Rejections

The Examiner rejected claims 1, 2, 6-12, 15-19, 23-28, 31-35, 38-41, and 43-45 as being obvious over the '734 reference and Baker. The Examiner contends that all of the limitations of the rejected claims are disclosed by the '734 reference except for "a position sensing means for determining the position of the object." The Examiner contends that this feature is shown by Baker. In particular, the Examiner stated that "Baker teaches to use position sensing means 50, 52, 60 to determine the position of the object (e.g., Fig. 2). Consequently, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of '734 to have included the position sensing means as taught by Baker to accurately determine the thickness of the object at different locations." (office action, page 3). These rejections should be withdrawn for the reasons set forth below.

Independent claim 1 of the present application is set forth below:

1. An apparatus for dynamically measuring thickness of a test object, comprising:
 - an eddy current sensor having first and second sensor heads, said sensor heads positioned opposite each other and defining a predetermined gap therebetween for passage by at least a portion of the test object through said gap, said first and second sensor heads making measurements at one or more sampling locations on said test object when at said gap;
 - a mechanism for moving the test object through said gap while said measurements are made;
 - a position sensing mechanism, said position sensing mechanism being used to determine one or more positions of said one or more sampling locations on said test object; and
 - an evaluation circuit in communication with the eddy current sensor and with the position sensing mechanism, said evaluation circuit being used to determine the thickness of the test object at said one or more sampling locations. (emphasis added)

According to an English language translation provided by the Examiner, the '734 reference discloses measuring the thickness of a coating on a film by passing the film through a gap between pairs of sensors. There is no disclosure or any suggestion of determining the

locations on the film at which the measurements are made as the Examiner acknowledges. The ‘734 reference therefore does not disclose “a position sensing mechanism, said position sensing mechanism being used to determine one or more positions of said one or more sampling locations on said test object” as specified by claim 1. The Examiner contends that Baker discloses this feature.

Baker discloses a wafer centering device used for determining the position of a wafer and then centering and rotating it relative to a given feature. The position of the wafer is determined by detecting an edge of the wafer using a light sensor 50, 52 and 60. (col. 4, line 60 to col. 5, line 14).

The rejections under 35 U.S.C. 103 are improper because the combination of the ‘734 reference and Baker fails to teach each and every limitation of claim 1. As mentioned, Baker discloses determining the position of the wafer itself so that the wafer can be properly centered. The reference does not disclose or suggest determining particular locations on the wafer. Claim 1 requires a position sensing mechanism being used to determine one or more positions of said one or more sampling locations on said test object. Neither the ‘734 reference, nor Baker disclose such a position sensing mechanism. Independent claim 1 is therefore patentable over the combination of the ‘734 reference and Baker. Claims 2 and 6-10 are dependent on claim 1, and are also allowable over the cited references.

The Hassan reference cited by the Examiner with respect to claims 3-5, 13, 14, 20-22, 29, 30, 36, 37, and 42 for disclosing a displacement sensor does not cure the deficiencies of Baker and the ‘734 reference noted above.

Claim 1 and dependent claims 2-10 are therefore patentable over the cited references.

The remaining claims in the application are also patentable over the references. Independent claim 11 specifies “determining one or more positions of said one or more sampling locations on said test object.” Claim 11 and its dependent claims 12-17 are also patentable over the cited references.

Independent claim 18 specifies “a position sensing mechanism to sense positions of said wafer substrate relative to said sensor heads as said wafer substrate is passed through said gap.” Claim 18 and its dependent claims 19-27 are also patentable over the cited references.

Independent claim 28 specifies “determining positions of said sampling locations on said wafer substrate.” Claim 28 and its dependent claims 29-33 are also patentable over the ‘the ‘734 reference and Baker.

Independent claim 34 specifies “determining positions of said sampling locations.” Claim 34 and its dependent claims 35-38 are also patentable over the cited references.

Independent claim 39 specifies “means for determining positions of said sampling locations.” Claim 39 and its dependent claims 40-43 are also patentable over the cited references.

Independent claim 44 specifies “determining one or more positions of said one or more sampling locations on said test object.” Claim 44 and its dependent claim 45 are also patentable over the cited references.

Claims 1-45 are pending in the present application. As the application is now believed to be in condition for allowance, issuance of a Notice of Allowance is respectfully requested.

The Commissioner is hereby authorized to charge any fee deficiency associated with this submission, or credit any overpayment to Deposit Account No. 08-0219.

Respectfully submitted,



Rajesh Vallabh
Reg. No. 35,761

Wilmer Cutler Pickering Hale and Dorr LLP
60 State Street
Boston, MA 02109
617-526-6505

January 3, 2006